

## ABSTRACT

A monolithically integrated VCSEL and photodetector, and a method of manufacturing same, are disclosed for applications where the VCSEL and photodetector require separate operation such as duplex serial data communications applications. A first embodiment integrates a VCSEL with an MSM photodetector on a semi-insulating substrate. A second embodiment builds the layers of a p-i-n photodiode on top of layers forming a VCSEL using a standard VCSEL process. The p-i-n layers are etched away in areas where VCSELs are to be formed and left where the photodetectors are to be formed. The VCSELs underlying the photodetectors are inoperable, and serve to recirculate photons back into the photodetector not initially absorbed. The transmit and receive pairs are packaged in a single package for interface to multifiber ferrules. The distance between the devices is precisely defined photolithographically, thereby making alignment easier.